Electronic Supplementary Material (ESI) for Sustainable Energy & Fuels.

Gradient Formation and Charge Carrier Dynamics of $CuBiI_4$ based Perovskite-like Solar Cells

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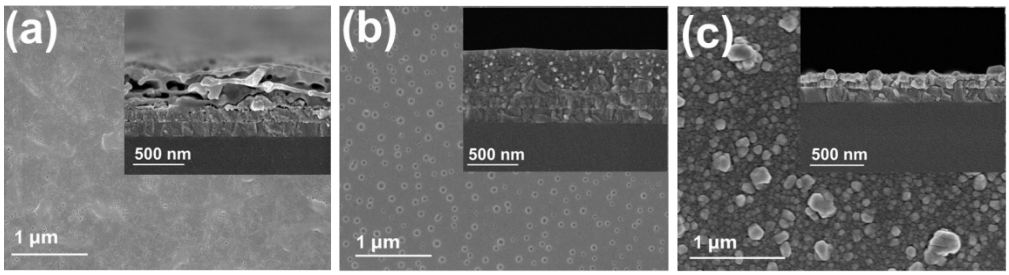

Figure S1. (a) $CuBiI_4$: P3HT thin film (Bi/Cu20 nm); (b) $CuBiI_4$: PTB7 thin film (Bi/Cu20 nm); (c) Bi/Cu20nm metal thin film. The insets show the corresponding cross-section of the thin films.

The morphology of P3HT and PTB7 coated $CuBiI_4$ thin films were also evaluated. Figure S1 a and S1 b show the top and cross sections of $CuBiI_4$: P3HT and $CuBiI_4$: PTB7 thin film fabricated by Bi/Cu 20 nm film precursor, respectively. Comparing with the $CuBiI_4$: P3HT thin films, $CuBiI_4$: PTB7 thin film performed dense and uniform morphology, which may benefit the charge carrier transfer in solar cell devices. The thickness of $CuBiI_4$: PTB7 thin film was about 500 nm and will be suitable for solar cell devices assembly. Figure S1 c shows the top-view and cross section SEM images of pristine Bi/Cu thin film. The thickness of Bi/Cu thin film is about 80 nm.

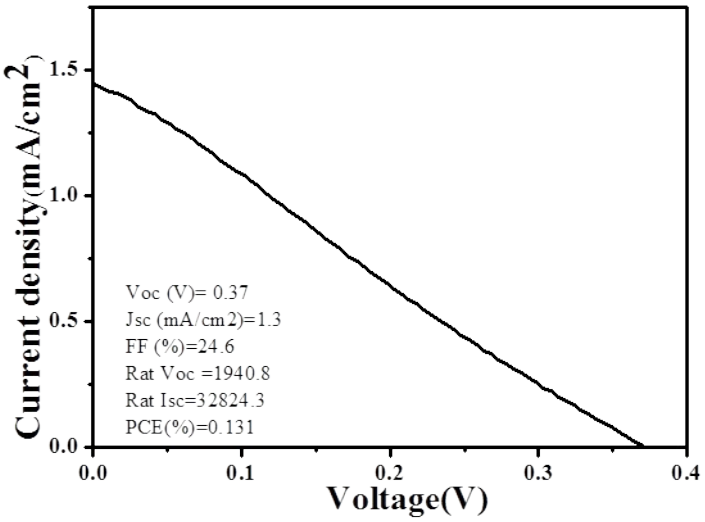

Figure S2. J-V curve of the ITO/SnO_2/$CuBiI_4$/Spiro-OMeTAD/Au device.